

# Single-Chip Multiple-Frequency RF MEMS Resonant Platform for Wireless Communications, Phase I

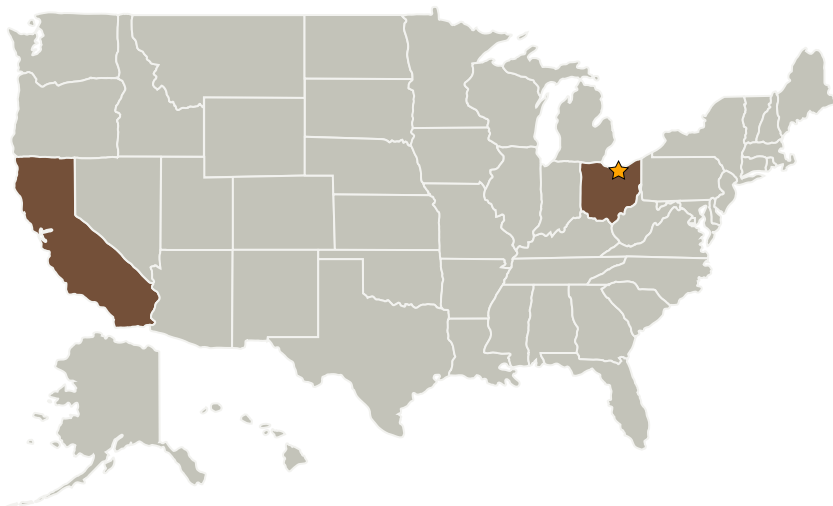
Completed Technology Project (2006 - 2006)



## Project Introduction

A novel, single-chip, multiple-frequency platform for RF/IF filtering and clock reference based on contour-mode aluminum nitride (AlN) MEMS piezoelectric resonators is proposed. This system is the first of its class to implement multiple frequency filtering and clock functions on the same silicon die. The AlN MEMS piezoelectric resonators proposed in this work have their fundamental frequency defined by the lateral, in-plane dimensions of the structure and therefore can be fabricated at the same time. This feature enables the definition of different frequencies directly at the CAD-layout level without the need of any extra etching or deposition steps as required by commercially available thickness-mode resonators such as thin-film bulk acoustic wave resonators (FBARs) or quartz crystals. MEMS AlN piezoelectric resonators characterized by low motional resistance and high quality factors in ambient conditions constitute the most economical and sole solution for reconfigurable, multi-band and multi-functional wireless networks. This RF multiple-frequency (100 MHz to 3 GHz) platform will provide new levels of component miniaturization, integration and performance for wireless communication devices, enabling smaller form factors and lower costs while opening the door for longer battery life.

## Primary U.S. Work Locations and Key Partners



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## Organizational Responsibility

### Responsible Mission Directorate:

Space Technology Mission  
Directorate (STMD)

### Lead Center / Facility:

Glenn Research Center (GRC)

### Responsible Program:

Small Business Innovation  
Research/Small Business Tech  
Transfer

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Organizations Performing Work	Role	Type	Location
★ Glenn Research Center(GRC)	Lead Organization	NASA Center	Cleveland, Ohio
Harmonic Devices, Inc.	Supporting Organization	Industry	Berkeley, California

## Primary U.S. Work Locations

California	Ohio
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## Project Management

**Program Director:**

Jason L Kessler

**Program Manager:**

Carlos Torrez

## Technology Areas

**Primary:**

- TX05 Communications, Navigation, and Orbital Debris Tracking and Characterization Systems
  - └ TX05.1 Optical Communications
  - └ TX05.1.6 Optometrics